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MS APPEAL BRIEF - PATENTS
PATENT
0965-0232P

IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Toshiro NISHI et al.

Appl. No.: 09/118,833

Filed: July 20, 1998

Conf.: 9403

For: SOLID ELECTROLYTE TYPE FUEL BATTERY

Before the Board of Appeals

Appeal No.:

Group: 1746

Examiner: J. CREPEAU

APPEAL BRIEF TRANSMITTAL FORM

MS APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 14, 2004

Sir:

Transmitted herewith is an Appeal Brief (in triplicate) on behalf of the Appellants in connection with the above-identified application.

☐ The enclosed document is being transmitted via the Certificate of Mailing provisions of 37 C.F.R. § 1.8.

A Notice of Appeal was filed on April 15, 2004.

☐ Applicant claims small entity status in accordance with 37 C.F.R. § 1.27

The fee has been calculated as shown below:

☒ Extension of time fee pursuant to 37 C.F.R. §§ 1.17 and 1.136(a) - $110.00.

☒ Fee for filing an Appeal Brief - $330.00 (large entity).

☒ Check(s) in the amount of $440.00 is(are) attached.

☐ Please charge Deposit Account No. 02-2448 in the amount of $0.00. A triplicate copy of this sheet is attached.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachment(s)

(Rev. 02/08/2004)

PATENT
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IN THE U.S. PATENT AND TRADEMARK OFFICE

In re application of

Toshiro NISHI et al.

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Appeal No.

Appl. No.:	09/118,833	Group:	1746
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APPEAL BRIEF

Assistant Commissioner for Patents
Washington, DC 20231

July 14, 2004

Sir:

In response to the Examiner's Office Action dated January 15, 2004, the following Appeal Brief is respectfully submitted in connection with the above-identified application.

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Filed:	July 20, 1998	Examiner:	J. Crepeau
Conf. No.:	9403		
For:	SOLID ELECTROLYTE TYPE FUEL BATTERY		

BRIEF ON APPEAL ON BEHALF OF APPELLANTS FILED UNDER PROVISIONS OF 37 C.F.R. § 1.192

Honorable Commissioner
of Patents
Washington, D.C. 20231

July 14, 2004

Dear Sir:

This is an Appeal from the Final Rejection of January 15, 2004 of claims 4-30 in the above-identified application.

I. REAL PARTY IN INTEREST

As evidenced by the Assignment filed July 20, 1998, and recorded at Reel 9351, Frames 0059-0063, the Real Party In Interest in connection with the present application is the Assignee of record, MITSUBISHI HEAVY INDUSTRIES, LTD.

II. RELATED APPEALS AND INTERFERENCES

There are no pending Appeals or Interferences related to the present application known to Appellants or Appellants' Legal Representatives.

III. STATUS OF CLAIMS

Claims 4-30 are pending in the application. Claims 4-30 stand rejected.

IV. STATUS OF AMENDMENTS

An Amendment Under 37 C.F.R. § 1.111 was filed on February 28, 2000. An Amendment filed on July 10, 2000 was entered by the Advisory Action mailed July 21, 2000. An Amendment Under 37 C.F.R. § 1.116 was filed on September 11, 2000 and was refused entry in the Advisory Action mailed September 19, 2000. A Reply Under 37 C.F.R. § 1.116 was filed on February 12, 2001, that presented a Declaration Under 37 C.F.R. § 1.132 by Toshiro Nishi. A Continued Prosecution Application Under 37 C.F.R. § 1.53(d) was filed on May 10, 2001. A Preliminary Amendment was filed on August 7, 2001. An Amendment Under 37 C.F.R. § 1.111 (which presented appealed claims 4-28 in their final form as presented on Appeal) was filed on April 11, 2002. A Reply Under 37 C.F.R. § 1.116 was filed on November 18, 2002, that presented a second Declaration Under 37 C.F.R. § 1.132 by Toshiro Nishi, which was considered and entered by the Advisory Action mailed November 29, 2002. A Supplemental Reply Under 37

C.F.R. § 1.116 was filed on March 13, 2003, that presented a third Declaration Under 37 C.F.R. § 1.132 by Toshiro Nishi, which was considered and entered by the Advisory Action mailed March 27, 2003. An Appeal Brief was filed on May 16, 2003. After reopening prosecution on the merits, an Amendment Under 37 C.F.R. § 1.111 was filed on October 24, 2003. A Reply Under 37 C.F.R. § 1.116 was filed on April 26, 2004. By an Advisory Action mailed May 3, 2004, the Reply was entered, thereby overcoming a rejection of claim 29 under 35 U.S.C. § 112, first paragraph.

V. SUMMARY OF INVENTION

The present invention as recited in claim 4 pertains to a solid electrolyte fuel battery, in which a sintered interconnector is used for connecting cells of the solid electrolyte fuel battery, and the sintered interconnector comprises a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba. The sintered interconnector is formed by, for instance, coating materials onto a surface and sintering them. (page 6, lines 15-22) The material of the interconnector can be $MTiO_3$ where M is Mg, Ca, Sr or Ba. (page 5, lines 5-10)

In another embodiment of the invention as recited in claims 6 and 8, the present invention relates to a solid electrolyte fuel battery, in which a co-sintered interconnector for connecting cells of the solid electrolyte fuel battery comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$

where A is Ca, Sr or Ba (claim 6) or Mg (claim 8), B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$. That is, the co-sintered interconnector is $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Mg (e.g. claim 8), or Ca, Sr or Ba (claim 6), B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$. (page 17, lines 6-7; page 22, lines 15-18; page 25, line 20; page 30, lines 6-7, page 35, line 4; page 36, lines 13-15; page 39, lines 25-26).

In the invention, the interconnector can be integrally burned within the battery. (claims 12-23; page 5, line 28 to page 6, line 8) The integrally burning can be performed at low temperatures such as 1,300 to 1,400 °C. (claims 21-23; page 6, line 13) The interconnector can be a hermetic interconnector having a relative density of greater to or equal to 94%. (claim 24; page 15, line 15) In the interconnector, the current passage can be in the vertical direction. (claims 5, 7, 9, 18-20; page 5, lines 13-15)

VI. ISSUES

The first issue presented for review is whether Soma (USP 5,411,767) anticipates all of the limitations set forth in claims 4, 10-13, 21, 24 and 27-30 to properly support a rejection under 35 U.S.C. § 102. The second issue presented for review is whether Soma suggests all the elements of claims 6, 8, 14-17, 22, 23, 25 and 26 to properly support a rejection under 35 U.S.C. § 103. The third

issue presented for review is whether JP 8-50913 (JP '913) in view of Soma suggests all of the limitations set forth in claims 4-30 to properly support a rejection under 35 U.S.C. § 103.

These issues are divided into Groups I-XXIII, which are separately argued below.

VII. GROUPING OF CLAIMS

Appellants submit that claims 4-30 do not stand or fall together. Instead, Appellants respectfully wish to group claims 4-30 as follows:

Group I:	claim 4;
Group II:	claim 5;
Group III:	claim 24;
Group IV:	claim 6;
Group V:	claim 7;
Group VI:	claim 25;
Group VII:	claim 8;
Group VIII	claim 9;
Group IX	claim 26;
Group X	claims 10 and 11;
Group XI	claim 27;
Group XII	claims 12 and 13;

Group XIII	claim 18;
Group XIV	claim 21;
Group XV	claims 14 and 15;
Group XVI	claim 19;
Group XVII	claim 22;
Group XVIII	claims 16 and 17;
Group XIX	claim 20;
Group XX	claim 23;
Group XXI	claim 28;
Group XXII	claim 29; and
Group XXIII	claim 30.

VIII. ARGUMENT

A. Group I, Independent Claim 4

Soma fails to teach or suggest all of the elements set forth in claim 4 to properly support a rejection under 35 U.S.C. § 102. JP '913 in view of Soma fails to suggest all of the elements set forth in claim 4 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention set forth in three declarations of unexpected results.

A.1. The Present Invention and its Advantages

The inventors have produced a solid electrolyte fuel battery, "in which a sintered interconnector is used for connecting cells of the solid electrolyte fuel battery, and the sintered interconnector comprises a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba." (claim 4) The inventive sintered $MTiO_3$ matrix can be easily burned and has a small difference in expansion between oxidizing conditions and reducing conditions when used as a fuel cell interconnector. The resulting solid electrolyte fuel battery has excellent durability and reliability, and the battery can be easily produced. See page 5, lines 16-23 of the specification.

Sintering provides important advantages to the invention. The claimed solid electrolyte fuel battery may be produced using ordinary manufacturing methods such as dipping, coating, slip casting or printing.

Sintering represents one of several discrete alternative methods of forming the interconnector. This is discussed at page 6, lines 15-22 of the specification, which states:

> The interconnector of the invention can be sintered at a low temperature. Thus, a solid electrolyte type fuel battery can be produced by an ordinary manufacturing method using a ceramic slurry, such as dipping coating, slip casting, or printing. The fuel battery can also be produced by the thermal spraying method that uses a powdery staring material, or by vacuum evaporation of raw materials other than oxides.

A.2. *Soma and JP '913*

A.2.1 Soma

Summary of Soma

The heat treated material of Soma produces a porous structure that is fundamentally different from the densified sintered interconnector of the invention. Soma thus fails to anticipate the invention and additionally fails to suggest the invention, either alone or in combination.

Argument

Soma pertains to a method for producing an interconnector for a solid electrolyte type fuel cell. The Abstract of Soma states: "An interconnector material such as a perovskite complexed oxide is thermally sprayed onto the surface of an electrode of a solid electrolyte type fuel cell by plasma thermal spraying process at a temperature of not lower than 1,250 °C."

Soma fails to teach or suggest a "sintered interconnector" such as is set forth in claim 4.

As noted at page 17 of the Appeal Brief filed May 16, 2003, the Examiner has inferred that two discrete steps are needed in Soma to form the material. The present invention, in contrast, is directed to a battery having a sintered interconnector and to a process that requires only one step: integrally burning or sintering. The Examiner has therefore 1) verified that Soma uses a

fundamentally different process than that of the invention, or 2) the principal of operation must be changed.

At page 7, lines 1-5 of the Office Action mailed July 24, 2003, the Examiner responds:

> In response, it is agreed that Soma teaches that two discrete steps are needed to form the material: plasma spraying and sintering. However, the present invention, as claimed, is not limited only to a 'sintering' step. The claims are open-ended and may include process steps other than sintering. Thus the claims do not exclude the plasma spraying step of Soma.

The processes of "sintering" and "heat treatment" are, however, fundamentally different and do not represent equivalent art.

Soma does disclose an interconnector that is formed by plasma spraying followed by a heat treatment. See, e.g., Soma at column 2, lines 10-16. However, an interconnector formed by such a process would have substantial differences when compared to an inventive interconnector.

One having ordinary skill would recognize that "heat treatment" is a process that carries out an adjustment of the crystalline structure of the particles. In contrast, "sintering" is a process that makes a tight bond between particles.

Thus, there might be an example where the interconnector is formed by "plasma spraying," and the interconnector is treated with heat sometime later. However, one having ordinary skill would recognize that it is practically non-

existent to carry out "plasma spraying" and "heat treatment" in a concurrent manner. That is, if the two steps were carried out concurrently, it would be meaningless to carry out the plasma spraying.

In his Response to Arguments at page 7 of the Office Action of January 15, 2004, the Examiner addresses the differences between the difference between "heat treatment" and "sintering:" "However, this assertion is not persuasive because it is not supported by sufficient evidence. It is well-settled that arguments of counsel cannot take the place of factually supported objective evidence."

However, the appellants have produced evidence demonstrating the fundamental differences between heat treatment and sintering. For example, the Reply filed March 13, 2003 included a Declaration presenting SEM photomicrographs comparing the porous structure of the plasma-spray film compared to the dense structure of the sintered material of the invention. Incidentally, page 2 of the Declaration notes that air spaces are formed by thermal etching, a heat treatment step that is different from sintering. Further, this Declaration was submitted for the purpose of showing that sintering is not the same as heat treatment.

Further, at page 3, lines 18-21 of The Office Action mailed July 16, 2002 (Paper No. 24), the Examiner states "Additionally, regarding the 'co-sintered' and 'integrally burned' limitations in the claims, these limitations are not considered

to patentably distinguish over the Soma reference. These limitations are essentially process limitations, and therefore allow the claims to be interpreted as product-by-process claims."

However, *Webster's Encyclopedic Unabridged Dictionary of the English Language* (Random House, 1996) provides relevant definitions of "sinter" as being "the product of a sintering operation" or "to bring about agglomeration (in metal particles) by heating." Also, an appellant can be his own lexicographer. In the present case, the term "sintering" is being used with respect to its classical definition. See, e.g., In re Paulsen, 30 F.3d 1475, 1480, 31 U.S.P.Q.2d 1671, 1674 (Fed. Cir. 1994). Further, "during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed." In re Zletz, 893 F.2d 319, 321, 13 U.S.P.Q.2d 1320, 1322 (Fed. Cir. 1989).

Also, as known to routineers in the art, sintered materials can be readily discerned by fused particles observable in SEM (scanning electron microscope) photomicrographs that can be found for example on the Internet at www.Osmonics.com/products/page764.htm or www.avxcorp.com/docs/technoinf/bscant.pdf.

As a result, the Appellants have clearly provided clarification of the language to amply demonstrate that the thermally sprayed material of Soma is fundamentally different from the sintered or co-sintered material of the

invention.

However, in his Response to Arguments at page 8 of the Office Action of January 15, 2004, the Examiner equates a homogeneous phase with agglomeration: "Soma teaches a heat treatment step which results in the crystalline phases in the film becoming a homogeneous single phase so that the film is microstructurally homogenized and densified." In contrast, the *Merriam-Webster Online Dictionary* (www.m-w.com) defines agglomeration as "a heap or cluster of usually disparate elements." The *American Heritage Dictionary of the American Language* defines agglomerate as "A confused or jumbled mass of things clustered together; a heap." As a result, one cannot equate "agglomeration" with "a homogeneous single phase" as is posited by the Examiner.

Summary of Soma

In summary, the heat treated material of Soma produces a porous structure that is fundamentally different from the densified sintered interconnector of the invention. Soma thus fails to anticipate the invention and additionally fails to suggest the invention, either alone or in combination.

A.2.2 JP'913 In View Of Soma

In Summary, JP '913 fails to disclose the material of the interconnector, and thus JP '913 fails to address the deficiencies of Soma.

JP '913 pertains to a solid electrolyte type fuel cell in which the air electrode and the interconnector can be simultaneously molded. JP '913 fails to disclose the material of the interconnector. The Examiner admits this failure in paragraph 3 of the Office Action mailed July 16, 2002 (Paper No. 24).

In the conventional fuel battery shown in Figs. 5 and 6 of JP '913, a solid electrolyte layer 14 is formed at the outer circumference of the cylinder-shaped air electrode 13, and a fuel electrode is formed on the outer frame of the solid electrolyte layer 14. Fig. 1 of JP '913 shows an interconnector 24 molded to a part of the cylinder portion of the air electrode that concurrently acts as a support tube. Although this structure may achieve a small-size, lightweight fuel battery, the JP '913 reference merely discloses the feature of integrally sintering electrodes in the manufacturing process of the fuel battery.

The Examiner then turns to the teachings of Soma for the materials of the interconnector. However, the inability of Soma to be utilized to allege *prima facie* obviousness has been discussed above.

Also, to establish a *prima facie* case of obviousness, it is necessary for the Examiner to present evidence, preferably in the form of some teaching, suggestion, incentive, or inference in the applied prior art, or in the form of generally available knowledge, that one having ordinary skill in the art would have been lead to use the relevant teachings of the applied references in the proposed manner asserted by the Examiner to arrive at the invention. See Ex

parte Levengood, 28 U.S.P.Q.2d 1300 (Bd. Pat. App. & Interferences Apr. 22, 1993). Because the Examiner bears the initial burden of presenting a *prima facie* case of obviousness, if this burden is not met, then the burden of coming forth with evidence or argument does not shift to the Appellant. In re Rijckaert, 9 F.3d 1531, 28 U.S.P.Q.2d 1955 (Fed. Cir. 1993). Likewise, where an Examiner fails to establish a proper *prima facie* case, the rejection is improper, and should be overturned. In re Fine, 837 F.2d 1071, 5 U.S.P.Q.2d 1596 (Fed. Cir. 1988).

Further, the rigorous burden placed upon the Examiner for establishing *prima facie* obviousness has been emphasized by the United States Court of Appeals for the Federal Circuit in In re Lee, 277 F.3d 1338, 61 U.S.P.Q.2d 1430 (Fed. Cir. 2002). In Lee, the court states:

> As applied to the determination of patentability vel non when the issue is obviousness, "it is fundamental that rejections under 35 U.S.C. § 103 must be based on evidence comprehended by the language of that section." In re Grasselli, 713 F.2d 731, 739, 218 U.S.P.Q. 769, 775 (Fed. Cir. 1983). The essential factual evidence on the issue of obviousness is set forth in Graham v. John Deere Co., 383 U.S. 1, 17-18, 86 S. Ct. 684, 15 L.Ed.2d 545, 148 U.S.P.Q. 459, 467 (1966) and extensive ensuing precedent. The patent examination process centers on prior art and the analysis thereof. When patentability turns on the question of obviousness, the search for and analysis of the prior art includes evidence relevant to the finding of whether there is a teaching, motivation, or suggestion to select and combine the references relied on as evidence of obviousness. See, e.g., McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1351-52, 60 U.S.P.Q.2d 1001, 1008 (Fed. Cir. 2001) ("the central question is whether there is reason to combine [the] references," a question of fact drawing on the Graham

factors).

"The factual inquiry whether to combine references must be thorough and searching." Id. It must be based on objective evidence of record. This precedent has been reinforced in myriad decisions, and cannot be dispensed with. See, e.g., Brown & Williamson Tobacco Corp. v. Philip Morris Inc., 229 F.3d 1120, 1124-25, 56 U.S.P.Q.2d 1456, 1459 (Fed. Cir. 2000) ("a showing of a suggestion, teaching, or motivation to combine the prior art references is an 'essential component of an obviousness holding'") (quoting C.R. Bard, Inc., v. M3 Systems, Inc., 157 F.3d 1340, 1352, 48 U.S.P.Q.2d 1225, 1232 (Fed. Cir. 1998)); In re Dembiczak, 175 F.3d 994, 999, 50 U.S.P.Q.2d 1614, 1617 (Fed. Cir. 1999) ("Our case law makes clear that the best defense against the subtle but powerful attraction of a hindsight-based obviousness analysis is rigorous application of the requirement for a showing of the teaching or motivation to combine prior art references."); In re Dance, 160 F.3d 1339, 1343, 48 U.S.P.Q.2d 1635, 1637 (Fed. Cir. 1998) (there must be some motivation, suggestion, or teaching of the desirability of making the specific combination that was made by the applicant); In re Fine, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) ("'teachings of references can be combined only if there is some suggestion or incentive to do so.'") (emphasis in original) (quoting ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984)).

The need for specificity pervades this authority. See, e.g., In re Kotzab, 217 F.3d 1365, 1371, 55 U.S.P.Q.2d 1313, 1317 (Fed. Cir. 2000) ("particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected these components for combination in the manner claimed"); In re Rouffet, 149 F.3d 1350, 1359, 47 U.S.P.Q.2d 1453, 1459 (Fed. Cir. 1998) ("even when the level of skill in the art is high, the Board must identify specifically the principle, known to one of ordinary skill, that suggests the claimed combination. In other words, the Board must explain the reasons one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious."); In re Fritch, 972 F.2d 1260, 1265, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992) (the examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to

combine the relevant teachings of the references").

In re Lee, 277 F.3d at 1342-1343, 61 U.S.P.Q.2d at 1433-1434 (emendation in the original).

The Examiner uses the teachings of Soma for material components. However, the Examiner fails to realize that Soma represents a fundamentally different technology. A prior art reference is analogous if the reference is in the field of Appellants' endeavor or, if not, the reference is reasonably pertinent to the particular problem with which the inventor was concerned. "In order to rely on a reference as a basis for rejection of the applicant's invention, the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." In re Oetiker, 977 F.2d 1443, 1447, 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992). However, the field of endeavor of Soma is thermal spraying, which is in marked contrast to the sintering of the present invention. Thus, Soma is non-analogous art. As a result, the Examiner has relied upon impermissible hindsight reconstruction, discussed above, to combine Soma with JP '913.

In Summary, JP '913 fails to disclose the material of the interconnector, and thus JP '913 fails to address the deficiencies of Soma. As a result, a case of *prima facie* obviousness has not been made over Soma or over JP '913 in view of Soma.

A.2.3 Unexpected Results

Even if it is assumed *arguendo*, that prima facie obviousness can be alleged over Soma or the combination of JP '913 with Soma, this obviousness would be fully rebutted by the three showings of unexpected results submitted as Declarations Under 37 C.F.R. § 1.132.

The first Declaration was filed on February 12, 2002. The first Declaration clearly describes the inventive process of sintering compared to the Soma-type thermal spraying process. The appendices to this first Declaration included overheads describing the sintering process and two publications pertaining to plasma spraying. The Declaration use $LaCrO_3$ as the exemplary material. Comparative result between sintering and thermal spraying were summarized in a table, which is reproduced as Table 1, below.

Table 1. Comparison of thermal spraying and sintering in fuel cell preparation.

	Fuel Cell Prepared by Thermal Spraying Process	Fuel Cell Prepared by Sintering Process (Present Invention)
Required time for production	150 min/fuel cell	15 min/fuel cell
Yield on materials	3 - 10%	90% or more
Equipment cost	Basic Amount	1/10
Construction Cost	Basic Amount	1/5
Materials Cost	Basic Amount	1/2
Cell production cost	1/3 million yen/kw	50,000 yen/kw

Despite the clear advantages of the invention, the Examiner did not allow the application. In the Advisory Action mailed February 28, 2001 (Paper No.

16), the Examiner stated:

> Independent claims 6 and 8 do not recite the process limitations that allegedly produce the unexpected results of the invention, therefore the declaration and arguments relating to these limitations are not commensurate in scope with these claims. Results in Table on page 4 of the declaration are only shown for a prior art composition of lanthanum chromite. However, lanthanum chromite is not germane to the outstanding rejection. A comparison between the process of Soma and the process of the present invention should be made using the materials relied upon in Soma.

That is, the Examiner failed to realize that clear advantages are realized for the sintering of any suitable material compared to the Soma-type thermal spraying.

On November 18, 2002, a second Declaration was placed before the Examiner. This second Declaration submitted SEM photomicrographs of a plasma sprayed material (A) and a co-sintered material (B). The Board of Appeals and Interferences is respectfully requested to refer to the original blue photomicrographs in the originally filed declaration(s) in order to observe the dramatic differences in materials produced by the two different processes. The declaration at paragraph 3 states:

> When plasma spraying is applied as in SOMA and other conventional art processes, a number of air spaces are produced in the plasma-sprayed film having a thickness of from several to dozens of microns. This can be clearly observed in the dense-blue cored portion of SEM photomicrograph (A) (also note the micron bar for scale).

> In contrast, when the inventive co-sintering is utilized, a film having a very dense structure is formed. This is clearly observable in SEM photomicrograph (B). Incidentally, the portions that appear to be air spaces in SEM photomicrograph (B) are produced during thermal etching. However, the sizes of these air spaces are very small, on the order of submicrons, as indicated by the micron bar for scale.
>
> As a result, a "sintered" or "co-sintered" material such as an interconnector does not represent a process step. Instead, a "sintered" or "co-sintered" material represents a physical state of matter that is achieved through the sintering process. This state of matter is readily discernable by comparing SEM photomicrographs (A) and (B).
>
> Therefore, the plasma sprayed film of SOMA is incapable of attaining the sintered or co-sintered interconnector of the invention. Therefore, SOMA fails to either teach or suggest a sintered or co-sintered interconnector of the invention. The high density achievable by the inventive technology and demonstrated in the attached SEM photomicrographs are a clear demonstration of unexpected results over SOMA.

Despite the clear differences between the invention and Soma in the second Declaration, the Examiner was not convinced. In the Advisory Action mailed November 29, 2002 (Paper No. 27), the Examiner states that "the declaration does not appear to state that the materials being compared have the same chemical composition. This would be required for a meaningful comparison."

In the Advisory Action mailed November 29, 2002, the Examiner then stated: "Soma discloses a 'heat treatment' step of at least 1250 degrees C after the step of plasma spraying (col. 2, lines 47-57 and col. 6, lines 44-50 of

Soma). The declaration does not appear to account for this additional heat treatment step. This step is believed to be critical to the comparison of the process of Soma and the claimed process, as it is essentially a 'sintering' step . . ." However, if this heat treatment step is a sintering step, why use thermal spraying at all? That is, the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only requires one thermal step: sintering (see page 8 of the specification). Therefore, the Examiner is either 1) verifying that Soma uses a fundamentally different process from the invention, or 2) the principal of operation must be changed. If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. See In re Ratti, 270 F.2d 810, 123 U.S.P.Q. 349 (C.C.P.A. 1959). In either case, the rejections must fall by the Examiner's own admissions.

However, to further expedite prosecution, a third Declaration was filed on March 13, 2003. This Declaration resubmitted SEM photomicrographs and in paragraph 3 clearly stated "The materials (A) and (B) being compared have the same chemical composition." Therefore, the comparison between Soma and the invention is clear.

On March 27, 2003, the Examiner mailed an Advisory Action (Paper No. 30). In the Advisory Action, the Examiner still tried to equate the heat

treatment step of Soma with the sintering of the invention. The Examiner then asserted that even if the Declarations would overcome Soma as a primary reference, Soma could still be used as a secondary reference. However, the inability of Soma to be used to allege *prima facie* obviousness, e.g., by being non-analogous art, has been discussed in detail above. Further, the unexpected results in the three declarations are directed at the Soma reference.

Finally, it should be noted that the material recited in the claims have already been employed in a solid oxide fuel cell and has been shown to provide outstanding results as a new material. The materials of the present invention have been evaluated at International and Japanese Science Conferences by others, for example, the 9th Cimtec World Forum on New Materials (1999).

A.3 Summary

As has been shown, the Examiner has failed to either establish anticipation or obviousness over Soma because Soma fails to teach sintering, and Soma produces a porous doubly heat treated material that has fundamental differences over the densified sintered interconnector of the invention. JP '913 also fails to disclose the material of the inventive interconnector, and therefore a *prima facie* case of obviousness has not been made over the combination of JP '913 with Soma. Further, three declarations have clearly demonstrated unexpected results over the applied prior art.

Appellants therefore respectfully submit that the combination of limitations as set forth in independent claim 4 of Group I is not anticipated or obvious by Soma or the combination of Soma and JP '913, for the reasons explained above.

Accordingly, reversal of the Examiner's rejection based on the above arguments is respectfully requested.

B. Group II, Claim 5

The combination of JP '913 and Soma fails to suggest all of the limitations set forth in claim 5 to properly support the rejections of Group II under 35 U.S.C. § 103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 5 depends upon claim 4 (Group I), and all of the distinctions of the invention over Group I are equally applicable to Group II.

Claim 5 further recites the current passage of the interconnector is current collection in the vertical direction from a fuel electrode through the interconnector. This embodiment is supported at page 5, lines 13-15 of the specification.

In paragraph 5 of the Office Action mailed April 10, 2000 (Paper No. 8), the Examiner asserts that "the direction of current collection is a design choice that may be manipulated according to the needs of the artisan." The Examiner

repeats this assertion in paragraph 4 of the Office Action mailed October 26, 2001 (Paper No. 21).

However, as noted at page 8 of the Amendment filed July 10, 2002, vertical collection of current would not be an obvious design choice for one of ordinary skill in the art of producing fuel cells. Figures 44(a) and 44(b) of the instant invention depict vertical and horizontal current collection. As shown in Figure 44(a) and described on page 34, lines 8-10 of the specification, vertical current collection has advantages because high resistance can be evaded by the thinness of the interconnector. In vertical collection of current, the air electrode 15 is located just above the fuel electrode 12 via the interconnector 14. By thinning the layer of the interconnector, overvoltage due to resistance of the interconnector is decreased.

In contrast, Figure 44(b) of the application shows that current collection in the horizontal direction is disadvantageous because it is not applicable for high resistance material. In horizontal current collection, current needs to be passed through the thin film in the same direction as the axial direction. Thus, a decrease in overvoltage cannot be achieved.

As discussed above, horizontal current collection and vertical current collection are different processes that possess different properties. Thus, the vertical direction of the fuel cells of the instant invention is not an arbitrary design choice.

Also, at page 6 of the Final Office Action mailed January 15, 2004, the Examiner asserts that Figures 1 and 2 of JP '913 show an interconnector at the top of the tube, thus providing current collection in the "vertical" direction. However, the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic.

Therefore, claim 5 of Group II is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

C. Group III, Claim 24

Soma fails to anticipate and the combination of JP '913 and Soma fails to suggest all of the elements set forth in claim 24 to properly support the rejections of Group III under 35 U.S.C. §§ 102 and 103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 24 depends upon claim 4 (Group I), and all of the distinctions of the invention over Group I are equally applicable to Group III.

Claim 24 contains the additional distinction that the interconnector is a hermetic interconnector having a relative density of greater of equal to 94%. In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner asserts "Soma et al. teach interconnectors having relative densities of

at least 95% and which comprise perovskite materials that are not patentably distinct from the instantly claimed materials." Soma at column 9, lines 61-63 states: "It is possible to obtain a relative density of more than 95% according to the invention." At page 6, line 3 of the Office Action mailed January 15, 2004, the Examiner asserts that JP '913 teaches "an interconnector (24)."

However, Soma pertains to thermal spraying. Soma contains no teaching or suggestion pertaining to how high densities can be obtained in a sintered material. JP '913 fails to alleviate the deficiencies of Soma.

Therefore, claim 24 of Group III is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

D. Group IV, Claim 6

Soma fails to suggest all of the elements set forth in claim 6 to properly support a rejection under 35 U.S.C. § 103. JP '913 in view of Soma fails to suggest all of the elements set forth in claim 6 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention set forth in three declarations of unexpected results.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid

repetition.

Claim 6 is similar to claim 4 of Group I, except that the material of the interconnector "comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Ca, Sr or Ba, B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$."

In paragraph 4 of the Office Action mailed October 26, 2001, the Examiner admits the failure of the prior art of Soma to disclose the formula of claim 6 (and claim 8). See also, paragraph 5 of the Office Action mailed January 15, 2004 (rejecting claims 6, 8, 14-17, 22, 23, 25 and 26 over Soma). The Examiner then asserts "Regarding the subscript ranges of the $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ material, these ranges have not been shown to be critical variables in the practice of the invention. Applicant must show that the particular subscript ranges are critical, generally by showing that the claimed ranges achieve unexpected results relative to the prior art ranges." (citation omitted).

However, Fig. 30 of the application shows the criticality of the $x = 0.2$ limitation, and this result is directly opposite the teachings at column 4, lines 44 and 45 of Soma, which shows no criticality for an 0.2 fraction. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), cert. denied,

469 U.S. 851 (1984).

Also, at paragraph 5 (page 5, lines 1-2) of the Final Office Action mailed January 15, 2004, the Examiner admits to the failings of Soma, stating: "The reference does not teach the same subscript ranges for the $(La_{1-x}D_x)_{1-u}B_{1-w})_3$ compounds as recited in instant claims 6, 8, 14 and 16." The Examiner then asserts that these limitations would be obvious to one having ordinary skill.

However, the Examiner has alleged obviousness over Soma not by combining references, but over a single reference. To establish a *prima facie* case of obviousness, "the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP § 2142. In addition, if a reference needs to be modified to achieve the claimed invention "there must be a showing of a suggestion or motivation to modify the teachings of that reference to the claimed invention in order to support the obviousness conclusion." Sibia Neurosciences, Inc. v. Cadus Pharma. Corp., 225 F. 3d 1349, 1356, 55 U.S.P.Q.2d 1927, 1931 (Fed. Cir. 2000). As a result, the Examiner has failed to show how Soma teaches or suggests all the claim limitations.

Yet further, the Soma technology is based upon thermal spraying while the present invention uses sintering. Therefore, the principal of operation of Soma must be changed in order to use the reference to allege obviousness. If the proposed modification of the prior art would change the principal of operation of

the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. In re Ratti, 270 F.2d 810, 123 U.S.P.Q. 349 (C.C.P.A. 1959). See also MPEP § 2143.01.

As has been shown, the singe reference of Soma fails either to anticipate or be usable to allege *prima facie* obviousness over claim 6 of Group IV.

Therefore, claim 6 of Group IV is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

E. Group V, Claim 7

The combination of JP '913 with Soma fails to suggest all of the elements set forth in claim 7 to properly support the rejections of Group V under 35 U.S.C. § 103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 7 depends upon claim 6 (Group IV), and all of the distinctions of the invention over Group IV are equally applicable to Group V.

Claim 7 further recites the current passage of the interconnector is current collection in the vertical direction from a fuel electrode through the interconnector. This embodiment is supported at page 5, lines 13-15 of the specification.

In paragraph 5 of the Office Action mailed April 10, 2000 (Paper No. 8), the Examiner asserts that "the direction of current collection is a design choice that may be manipulated according to the needs of the artisan." The Examiner repeats this assertion in paragraph 4 of the Office Action mailed October 26, 2001 (Paper No. 21).

However, as noted at page 8 of the Amendment filed July 10, 2002, vertical collection of current would not be an obvious design choice for one of ordinary skill in the art of producing fuel cells. Figures 44(a) and 44(b) of the instant invention depict vertical and horizontal current collection. As shown in Figure 44 (a) and described on page 34, lines 8-10 of the specification, vertical current collection has advantages because high resistance can be evaded by the thinness of the interconnector. In vertical collection of current, the air electrode 15 is located just above the fuel electrode 12 via the interconnector 14. By thinning the layer of the interconnector, overvoltage due to resistance of the interconnector is decreased.

In contrast, Figure 44(b) of the application shows that current collection in the horizontal direction is disadvantageous because it is not applicable for high resistance material. In horizontal current collection, current needs to be passed through the thin film in the same direction as the axial direction. Thus, a decrease in overvoltage cannot be achieved.

As discussed above, horizontal current collection and vertical current

collection are different processes which possess different properties. Thus, the vertical direction of the fuel cells of the instant invention is not an arbitrary design choice.

Also, at page 6 of the Final Office Action mailed January 15, 2004, the Examiner asserts that Figures 1 and 2 of JP '913 show an interconnector at the top of the tube, thus providing current collection in the "vertical" direction. However, the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic.

Therefore, claim 7 of Group V is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

F. Group VI, Claim 25

Soma or the combination of JP '913 with Soma each fails to suggest all of the elements set forth in claim 25 to properly support the rejections of Group VI under 35 U.S.C. § 103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 25 depends upon claim 6 (Group IV), and all of the

distinctions of the invention over Group IV are equally applicable to Group VI.

Claim 25 contains the additional distinction that the interconnector is a hermetic interconnector having a relative density of greater or equal to 94%. In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner asserts "Soma et al. teach interconnectors having relative densities of at least 95% and which comprise perovskite materials that are not patentably distinct from the instantly claimed materials." Soma at column 9, lines 61-63 states: "It is possible to obtain a relative density of more than 95% according to the invention."

Also, The Examiner rejects claim 25 over the Single reference of Soma in paragraph 5 of the Office Action of January 15, 2004. However, the Examiner offers no rationale for his rejection. See also paragraph 4 of the Office Action mailed July 24, 2003.

However, Soma pertains to thermal spraying. Soma contains no teaching or suggestion pertaining to how high densities can be obtained in a sintered material.

Therefore, claim 25 of Group VI is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

G. Group VII, Claim 8

Soma fails to suggest all of the elements set forth in claim 8 to properly support a rejection under 35 U.S.C. § 103. JP '913 in view of Soma fails to suggest all of the elements set forth in claim 8 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention set forth in three declarations of unexpected results.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

Claim 8 is similar to claim 4 of Group I and claim 6 of Group IV, except that the material of the interconnector "comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Mg, B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$."

In paragraph 4 of the Office Action mailed October 26, 2001, the Examiner admits the failure of the prior art of Soma to disclose the formula of claim 8 (and claim 6). The Examiner then asserts "Regarding the subscript ranges of the $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ material, these ranges have not been shown to be critical variables in the practice of the invention. Applicant must show that

the particular subscript ranges are critical, generally by showing that the claimed ranges achieve unexpected results relative to the prior art ranges." (citation omitted). In paragraph 5 of the Office Action mailed January 15, 2004, the Examiner asserts that the claimed materials and the prior art materials have "substantially identical" compositions and would be expected to have similar properties.

However, Fig. 30 of the application shows the criticality of the x = 0.2 limitation, and this result directly opposes the teachings at column 4, lines 44 and 45 of Soma. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

Therefore, claim 8 of Group VII is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

H. Group VIII, Claim 9

The combination of JP '913 and Soma fails to suggest all of the elements set forth in claim 9 to properly support the rejections of Group VIII under 35 U.S.C. § 103.

Soma and JP '913 have been discussed above, and the general discussion

thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 9 depends upon claim 8 (Group VII), and all of the distinctions of the invention over Group VII are equally applicable to Group VIII.

Claim 9 further recites the current passage of the interconnector is current collection in the vertical direction. This embodiment is supported at page 5, lines 13-15 of the specification.

In paragraph 5 of the Office Action mailed April 10, 2000 (Paper No. 8), the Examiner asserts that "the direction of current collection is a design choice that may be manipulated according to the needs of the artisan." The Examiner repeats this assertion in paragraph 4 of the Office Action mailed October 26, 2001 (Paper No. 21).

However, as noted at page 8 of the Amendment filed July 10, 2002, vertical collection of current would not be an obvious design choice for one of ordinary skill in the art of producing fuel cells. Figures 44(a) and 44(b) of the instant invention depict vertical and horizontal current collection. As shown in Figure 44(a) and described on page 34, lines 8-10 of the specification, vertical current collection has advantages because high resistance can be evaded by thinness of the interconnector. In vertical collection of current, the air electrode 15 is located just above the fuel electrode 12 via the interconnector 14. By thinning the layer of the interconnector, overvoltage due to resistance of the interconnector is decreased.

In contrast, Figure 44(b) of the application shows that current collection in the horizontal direction is disadvantageous because it is not applicable for high resistance material. In horizontal current collection, current needs to be passed through the thin film in the same direction as the axial direction. Thus, a decrease in overvoltage cannot be achieved.

As discussed above, horizontal current collection and vertical current collection are different processes that possess different properties. Thus, the vertical direction of the fuel cells of the instant invention is not an arbitrary design choice.

Also, at page 6 of the Final Office Action mailed January 15, 2004, the Examiner asserts that Figures 1 and 2 of JP '913 show an interconnector at the top of the tube, thus providing current collection in the "vertical" direction. However, the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic.

Therefore, claim 9 of Group VIII is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejection based on the claimed combination of limitations and the above arguments is respectfully requested.

I. Group IX, Claim 26

Soma or the combination of Soma and JP '913 fails to suggest all of the

elements set forth in claim 26 to properly support the rejections of Group IX under 35 U.S.C. § 103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 26 depends upon claim 8 (Group VII), and all of the distinctions of the invention over Group VII are equally applicable to Group IX.

Claim 26 contains the additional distinction that the interconnector is a hermetic interconnector having a relative density of greater or equal to 94%. In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner asserts: "Soma et al. teach interconnectors having relative densities of at least 95% and which comprise perovskite materials that are not patentably distinct from the instantly claimed materials." See also, paragraph 6 (page 6, line 10) of the Office Action mailed January 15, 2004. Soma at column 9, lines 61-63 states: "It is possible to obtain a relative density of more than 95% according to the invention."

However, Soma pertains to thermal spraying. Soma contains no teaching or suggestion pertaining to how high densities can be obtained in a sintered material.

Therefore, claim 26 of Group IX is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

J. Group X, Claims 10-11

Soma fails to anticipate all of the elements set forth in claims 10-11 to properly support a rejection under 35 U.S.C. § 102. JP '913 in view of Soma fails to suggest all of the elements set forth in claims 10-11 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention set forth in three declarations of unexpected results.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

The inventors have produced a solid electrolyte fuel battery, in which "an interconnector for connecting cells of the solid electrolyte fuel battery comprises a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba, wherein the interconnector is integrally burned within said battery. (claim 10)

Regarding the "integrally burned" embodiment, JP '913 pertains to a solid electrolyte fuel cell that is "integrally sintered." See English Abstract of JP '913. In paragraph 6 (page 6, line 3) of the Office Action mailed January 15, 2004, the Examiner asserts that JP '913 teaches "an interconnector (24)." The Examiner admits that JP '913 fails to teach the material(s) that comprise the

interconnector, or the temperature at which the sintering is performed. See, e.g., paragraph 3 of the Office Action mailed July 16, 2002 (Paper No. 24). The Examiner, then turns to Soma for teachings pertaining to materials.

However, the inability of Soma or JP '913 and Soma to anticipate or suggest the present invention has been discussed in detail above, along with the showings of unexpected results. For brevity, the distinctions of the invention over Soma or JP '913 and Soma are not repeated here.

Therefore, claims 10-11 of Group X are patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

K. Group XI, Claim 27

Soma fails to anticipate and the combination of JP '913 and Soma fails to suggest all of the elements set forth in claim 27 to properly support the rejections of Group XI under 35 U.S.C. §§ 102 and 103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 27 depends upon claim 10 (Group X), and all of the distinctions of the invention over Group X are equally applicable to Group XI

Claim 27 contains the additional distinction that the interconnector is a

hermetic interconnector having a relative density of greater or equal to 94%. In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner asserts: "Soma et al. teach interconnectors having relative densities of at least 95% and which comprise perovskite materials that are not patentably distinct from the instantly claimed materials." See also paragraph 4 (page 4, lines 5-6) of the Office Action of January 15, 2004. Soma at column 9, lines 61-63 states: "It is possible to obtain a relative density of more than 95% according to the invention."

However, Soma pertains to thermal spraying. Soma contains no teaching or suggestion pertaining to how high densities can be obtained in a sintered material.

Therefore, claim 27 of Group XI is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

L. Group XII, Claims 12 and 13

Soma fails to anticipate all of the elements set forth in claims 12-13 to properly support a rejection under 35 U.S.C. § 102. JP '913 in view of Soma fails to suggest all of the elements set forth in claims 12-13 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention

set forth in three declarations of unexpected results.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

Claim 12 is a method claim comprising integrally burning within the battery the interconnector for connecting cells of the solid electrolyte fuel battery. The battery and interconnector contain all the structural limitations of claim 4 Group I. As a result, all of the distinctions of the invention over Soma and JP '913 set forth for Group I are equally valid for claims 12 and 13 of Group XII. That is, JP '913 and Soma fail to support an allegation of *prima facie* obviousness over claims 12-13. Even if obviousness can be alleged, unexpected results offer full rebuttal.

Accordingly, reversal of the Examiner's rejection based on the claimed combination of limitations and the above arguments is respectfully requested.

M. Group XIII, Claim 18

JP '913 and Soma fail to suggest all of the elements set forth in claim 18 to properly support the rejections of Group XIII under 35 U.S.C. § 103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 18 depends upon claim 12 (Group XII), and all of the

distinctions of the invention over Group XII are equally applicable to Group XIII.

Claim 18 further recites the current passage of the interconnector is current collection in the vertical direction. This embodiment is supported at page 5, lines 13-15 of the specification.

In paragraph 5 of the Office Action mailed April 10, 2000 (Paper No. 8), the Examiner asserts that "the direction of current collection is a design choice that may be manipulated according to the needs of the artisan." The Examiner repeats this assertion in paragraph 4 of the Office Action mailed October 26, 2001 (Paper No. 21).

However, as noted at page 8 of the Amendment filed July 10, 2002, vertical collection of current would not be an obvious design choice for one of ordinary skill in the art of producing fuel cells. Figures 44(a) and 44(b) of the instant invention depict vertical and horizontal current collection. As shown in Figure 44(a) and described on page 34, lines 8-10 of the specification, vertical current collection has advantages because high resistance can be evaded by thinness of the interconnector. In vertical collection of current, the air electrode 15 is located just above the fuel electrode 12 via the interconnector 14. By thinning the layer of the interconnector, overvoltage due to resistance of the interconnector is decreased.

In contrast, Figure 44(b) of the application shows that current collection in the horizontal direction is disadvantageous because it is not applicable for high

resistance material. In horizontal current collection, current needs to be passed through the thin film in the same direction as the axial direction. Thus, a decrease in overvoltage cannot be achieved.

As discussed above, horizontal current collection and vertical current collection are different processes which possess different properties. Thus, the vertical direction of the fuel cells of the instant invention is not an arbitrary design choice.

Also, at page 6 of the Final Office Action mailed January 15, 2004, the Examiner asserts that Figures 1 and 2 of JP '913 show an interconnector at the top of the tube, thus providing current collection in the "vertical" direction. However, the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic.

Therefore, claim 18 of Group XIII is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejection based on the claimed combination of limitations and the above arguments is respectfully requested.

N. Group XIV, Claim 21

Soma fails to anticipate all of the elements set forth in claim 21 to properly support the rejection of Group XIV under 35 U.S.C. § 102. JP '913 and Soma fail to suggest all of the elements set forth in claim 21 to properly support the

rejection of Group XIV under 35 U.S.C. § 103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 21 depends upon claim 12 (Group XII), and all of the distinctions of the invention over Group XII are equally applicable to Group XIV.

Claim 21 further covers the embodiment that integrally burning is performed at a temperature of 1,300 °C to 1,400 °C. This advantageous temperature is discussed at page 6, lines 11-13 of the specification, which states: "This material can be burned not at a conventional high temperature of 1,600 °C, but at a lower temperature of 1,300 to 1,400 °C . . ."

In paragraph 4 (page 4,lines 6-7) of the Office Action mailed January 15, 2004, the Examiner asserts that table 1 of Soma discloses heat treatment at 1400 °C. However, the heat treatment of Soma is fundamentally different from the inventive process.

In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner analogizes the heat treatment temperature of Soma to the inventive integrally burning step. However, the logical failures of this analogy have been discussed above. Indeed, if this heat treatment step of Soma is an integrally burning or sintering step, why use thermal spraying at all? That is, the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only requires one step:

sintering. Therefore, the Examiner is either 1) verifying that Soma uses a fundamentally different process from the invention, or 2) the principal of operation must be changed. See In re Ratti. In either case, the rejection must fall by the Examiner's own admissions.

Therefore, claim 21 of Group XIV is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

O. Group XV, Claims 14 and 15

Soma or JP '913 in view of Soma fails to suggest all of the elements set forth in claims 14-15 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention set forth in three declarations of unexpected results.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

Claim 14 is a method claim comprising integrally burning within the battery the interconnector for connecting cells of the solid electrolyte fuel battery. Claim 15 sets forth components of the battery. The battery and interconnector contain all the structural limitations of claim 6 of Group IV. As a result, all of

the distinctions of the invention over Soma and JP '913 set forth for Group VI are equally valid for claims 14 and 15 of Group XV.

In paragraph 5 of the Office Action mailed January 15, 2004, the Examiner asserts that the claimed materials (of claims 6, 8, 14 and 16) and the prior art materials have "substantially identical" compositions and would be expected to have similar properties.

However, Fig. 30 of the application shows the criticality of the x = 0.2 limitation, and this result is directly opposite the teachings at column 4, lines 44 and 45 of Soma. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 U.S.P.Q. 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984).

That is, Soma or JP '913 and Soma each fail to support an allegation of *prima facie* obviousness over claims 14-15. Even if obviousness can be alleged, unexpected results offer full rebuttal.

Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

P. Group XVI, Claim 19

JP '913 and Soma fail to suggest all of the elements set forth in claim 19 to properly support the rejection of Group XVI under 35 U.S.C. § 103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 19 depends upon claim 14 (Group XV), and all of the distinctions of the invention over Group XV are equally applicable to Group XVI.

Claim 19 further recites the current passage of the interconnector is current collection in the vertical direction. This embodiment is supported at page 5, lines 13-15 of the specification.

In paragraph 5 of the Office Action mailed April 10, 2000 (Paper No. 8), the Examiner asserts that "the direction of current collection is a design choice that may be manipulated according to the needs of the artisan." The Examiner repeats this assertion in paragraph 4 of the Office Action mailed October 26, 2001 (Paper No. 21).

However, as noted at page 8 of the Amendment filed July 10, 2002, vertical collection of current would not be an obvious design choice for one of ordinary skill in the art of producing fuel cells. Figures 44(a) and 44(b) of the instant invention depict vertical and horizontal current collection. As shown in Figure 44(a) and described on page 34, lines 8-10 of the specification, vertical current collection has advantages because high resistance can be evaded by the thinness of the interconnector. In vertical collection of current, the air electrode 15 is located just above the fuel electrode 12 via the interconnector 14. By thinning the layer of the interconnector, overvoltage due to resistance of the

interconnector is decreased.

In contrast, Figure 44(b) of the application shows that current collection in the horizontal direction is disadvantageous because it is not applicable for high resistance material. In horizontal current collection, current needs to be passed through the thin film in the same direction as the axial direction. Thus, a decrease in overvoltage cannot be achieved.

As discussed above, horizontal current collection and vertical current collection are different processes that possess different properties. Thus, the vertical direction of the fuel cells of the instant invention is not an arbitrary design choice.

Also, in paragraph 6 at page 6 of the Final Office Action mailed January 15, 2004, the Examiner asserts that Figures 1 and 2 of JP '913 show an interconnector at the top of the tube, thus providing current collection in the "vertical" direction. However, the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic.

Therefore, claim 19 of Group XVI is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejection based on the claimed combination of limitations and the above arguments is respectfully requested.

Q. Group XVII, Claim 22

Soma or the combination of JP '913 and Soma fail to suggest all of the elements set forth in claim 22 to properly support the rejection of Group XIV under 35 U.S.C. § 103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 22 depends upon claim 14 (Group XV), and all of the distinctions of the invention over Group XV are equally applicable to Group XVII.

Claim 22 further covers the embodiment that integrally burning is performed at a temperature of 1,300 °C to 1,400 °C. This advantageous temperature is discussed at page 6, lines 11-13 of the specification, which states: "This material can be burned not at a conventional high temperature of 1,600 °C, but at a lower temperature of 1,300 to 1,400 °C . . ."

In paragraph 4 (page 4, lines 6-7) of the Office Action mailed January 15, 2004, the Examiner asserts that table 1 of Soma discloses heat treatment at 1400 °C. However, the heat treatment of Soma is fundamentally different from the inventive process. Also, the rejection of paragraph 4 of the January 15, 2004 Office Action was for anticipation. However, the rejection of claim 22 is for obviousness under paragraphs 5 and 6, but the Examiner has offered no grounds for rejection of claim 22 in paragraph 5 of the January 15, 2004 Office Action.

In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner analogizes the heat treatment temperature of Soma to the inventive integrally burning step. However, the cognitive failures of this analogy have been discussed above. That is, if this heat treatment step of Soma is an integrally burning or sintering step, why use thermal spraying at all? That is, the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only requires one step: sintering: Therefore, the Examiner is either 1) verifying that Soma uses a fundamentally different process from the invention, or 2) the principal of operation must be changed. See In re Ratti, *supra*. In either case, the rejection must fall by the Examiner's own admissions.

Therefore, claim 22 of Group XVII is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

R. Group XVIII, Claims 16 and 17

Soma or the combination of JP '913 in view of Soma fails to suggest all of the elements set forth in method claims 16 and 17 to properly support a rejection under 35 U.S.C. § 103. These failures of the cited art are accompanied by the Examiner's failure to acknowledge the clear advantages of the invention

set forth in three declarations of unexpected results.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

Claim 16 is a method claim (corresponding to product claim 8 of Group VII) incorporating the limitations of claim 4 of Group I and claim 6 of Group IV, except that the material of the interconnector "comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Mg, B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$." Claim 16 also contains the step of "integrally burning."

In paragraph 4 of the Office Action mailed October 26, 2001, the Examiner admits the failure of the prior art of Soma to disclose the formula of claim 8 (and claim 6). The Examiner then asserts "Regarding the subscript ranges of the $(La_{1-x}D_x)_{1-u}B_{1-w}O_3$ material, these ranges have not been shown to be critical variables in the practice of the invention. Applicant must show that the particular subscript ranges are critical, generally by showing that the claimed ranges achieve unexpected results relative to the prior art ranges." (citation omitted). The Examiner makes a similar assertion in the Office Action of January 15, 2004 at paragraph 5.

However, Fig. 30 of the application shows the criticality of the $x = 0.2$

limitation, and this result is directly opposite the teachings at column 4, lines 44 and 45 of Soma. A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc.

Regarding integrally burning, in paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner analogizes the heat treatment temperature of Soma to the inventive integrally burning step. However, the logical failures of this analogy have been discussed above. That is, if this heat treatment step of Soma is an integrally burning or sintering step, why use thermal spraying at all? That is, the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only requires one step: sintering: Therefore, the Examiner is either 1) verifying that Soma uses a fundamentally different process from the invention, or 2) the principal of operation must be changed. See In re Ratti. In either case, the rejection must fall by the Examiner's own admissions.

Therefore, claims 16 and 17 of Group XVIII are patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

S. Group XIX, Claim 20

JP '913 and Soma fail to suggest all of the elements set forth in claim 20 to properly support the rejection of Group XIX under 35 U.S.C. § 103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 20 depends upon claim 16 (Group XVIII), and all of the distinctions of the invention over Group XVIII are equally applicable to Group XIX.

Claim 20 further recites the current passage of the interconnector is current collection in the vertical direction. This embodiment is supported at page 5, lines 13-15 of the specification.

In paragraph 5 of the Office Action mailed April 10, 2000 (Paper No. 8), the Examiner asserts that "the direction of current collection is a design choice that may be manipulated according to the needs of the artisan." The Examiner repeats this assertion in paragraph 4 of the Office Action mailed October 26, 2001 (paper No. 21).

However, as noted at page 8 of the Amendment filed July 10, 2002, vertical collection of current would not be an obvious design choice for one of ordinary skill in the art of producing fuel cells. Figures 44(a) and 44(b) of the instant invention depict vertical and horizontal current collection. As shown in Figure 44(a) and described on page 34, lines 8-10 of the specification, vertical current collection has advantages because high resistance can be evaded by the

thinness of the interconnector. In vertical collection of current, the air electrode 15 is located just above the fuel electrode 12 via the interconnector 14. By thinning the layer of the interconnector, overvoltage due to resistance of the interconnector is decreased.

In contrast, Figure 44(b) of the application shows that current collection in the horizontal direction is disadvantageous because it is not applicable for high resistance material. In horizontal current collection, current needs to be passed through the thin film in the same direction as the axial direction. Thus, a decrease in overvoltage cannot be achieved.

As discussed above, horizontal current collection and vertical current collection are different processes that possess different properties. Thus, the vertical direction of the fuel cells of the instant invention is not an arbitrary design choice.

Also, in paragraph 6 at page 6 of the Final Office Action mailed January 15, 2004, the Examiner asserts that Figures 1 and 2 of JP '913 show an interconnector at the top of the tube, thus providing current collection in the "vertical" direction. However, the interconnector 24 shown in Figures 1 and 2 of JP '913 may be depicted in a fashion best suited to display the fuel cell, and the true orientation and current collection of the interconnector 24 is problematic.

Therefore, claim 20 of Group XIX is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejection based on the claimed combination of limitations and the above arguments is respectfully requested.

T. Group XX, Claim 23

Soma or the combination of JP '913 and Soma fail to suggest all of the elements set forth in claim 23 to properly support the rejection of Group XX under 35 U.S.C. § 103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 22 depends upon claim 16 (Group XVIII), and all of the distinctions of the invention over Group XVIII are equally applicable to Group XX.

Claim 23 further covers the embodiment that integrally burning is performed at a temperature of 1,300 °C to 1,400 °C. This advantageous temperature is discussed at page 6, lines 11-13 of the specification, which states: "This material can be burned not at a conventional high temperature of 1,600 °C, but at a lower temperature of 1,300 to 1,400 °C . . ."

In paragraph 4 (page 4,lines 6-7) of the Office Action mailed January 15, 2004, the Examiner asserts that table 1 of Soma discloses heat treatment at 1400 °C. However, the heat treatment of Soma is fundamentally different from the inventive process. Also, the rejection of paragraph 4 of the January 15, 2004 Office Action was for anticipation. However, the rejection of claim 23 is for obviousness under paragraphs 5 and 6, but the Examiner has offered no

grounds for rejection of claim 23 in paragraph 5 of the January 15, 2004 Office Action.

In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner analogizes the heat treatment temperature of Soma to the inventive integrally burning step. However, the logical failures of this analogy have been discussed above. That is, if this heat treatment step of Soma is an integrally burning or sintering step, why use thermal spraying at all? That is, the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only requires one step: sintering: Therefore, the Examiner is either 1) verifying that Soma uses a fundamentally different process from the invention, or 2) the principal of operation must be changed. See In re Ratti. In either case, the rejection must fall by the Examiner's own admissions.

Therefore, claim 23 of Group XX is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

U. Group XXI, Claim 28

Soma fails to anticipate and the combination of JP '913 and Soma fails to suggest all of the elements set forth in claim 28 to properly support the

rejections of Group XXI under 35 U.S.C. §§ 102 and103.

Soma and JP '913 have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

Claim 28 of Group XX is similar to claim 4 of Group I with the exception the matrix is "consisting essentially of" $MtiO_3$ where M is Mg, Ca, Sr, or Ba. That is, all the arguments and evidence for the patentability of claim 4 of Group I are equally applicable for claim 28 of Group XX. The arguments and evidence are hereby incorporated but not repeated for the sake of brevity.

Further, the "consisting essentially of" limitation renders this embodiment more restrictively defined over the prior art. As a result, the patentability of claim 28 of Group XX is entirely clear.

Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments and evidence is respectfully requested.

V. Group XXII, Claim 29

Soma fails to anticipate and the combination of JP '913 and Soma fails to suggest all of the elements set forth in claim 28 to properly support the rejections of Group XXII under 35 U.S.C. §§ 102 or103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition. Also, claim 29 depends upon claim 4 (Group I), and all of the distinctions of the invention over Group I are equally applicable to Group XX II.

Claim 29 further covers the embodiment that integrally burning is performed at a temperature of 1,300 °C to 1,400 °C. This advantageous temperature is discussed at page 6, lines 11-13 of the specification, which states: "This material can be burned not at a conventional high temperature of 1,600 °C, but at a lower temperature of 1,300 to 1,400 °C . . ."

In paragraph 4 (page 4,lines 6-7) of the Office Action mailed January 15, 2004, the Examiner asserts that table 1 of Soma discloses heat treatment at 1400 °C. However, the heat treatment of Soma is fundamentally different from the inventive process.

In paragraph 3 of the Office Action mailed July 17, 2002 (Paper No. 24), the Examiner analogizes the heat treatment temperature of Soma to the inventive integrally burning step. However, the logical failures of this analogy have been discussed above. That is, if this heat treatment step of Soma is an integrally burning or sintering step, why use thermal spraying at all? That is, the Examiner is inferring that two discrete steps are needed in Soma to form the material. In contrast, the present invention only requires one step:

sintering: Therefore, the Examiner is either 1) verifying that Soma uses a fundamentally different process from the invention, or 2) the principal of operation must be changed. See In re Ratti. In either case, the rejection must fall by the Examiner's own admissions.

Therefore, claim 29 of Group XXII is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

W. Group XXIII, Claim 30

Soma fails to anticipate and the combination of JP '913 and Soma fails to suggest all of the elements set forth in claim 30 to properly support the rejections of Group XXIII under 35 U.S.C. §§ 102 or103.

JP '913 and Soma have been discussed above, and the general discussion thereof is incorporated here, but is not being repeated here so as to avoid repetition.

Independent claim 30 pertains to a solid electrolyte fuel battery that includes cells of the solid electrolyte fuel battery; and a sintered interconnector for connecting the cells of the solid electrolyte fuel battery, the sintered interconnector comprising a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba, and the sintered material has been formed by a step consisting essentially of sintering the material after molding. Claim 30 (as

compared to claim 4) sets forth a more complete construction that includes the cells of the battery. That is, claim 30 contains all the limitations of claim 4 of Group I and all of the distinctions of the invention over the prior art set forth for Group I are equally applicable here.

The unexpected results in the three declarations should also be considered in view of the more complete fuel cell structure of claim 30. The unexpected results of the invention are typified in the first Declaration on February 12, 2002. The first Declaration clearly describes the inventive process of sintering compared to the Soma-type thermal spraying process. The appendices to this first Declaration included overheads describing the sintering process and two publications pertaining to plasma spraying. The Declaration uses $LaCrO_3$ as the exemplary material. Comparative results between sintering and thermal spraying were summarized in a table, which is reproduced as Table 1, below.

Table 1. Comparison of thermal spraying and sintering in fuel cell preparation.

	Fuel Cell Prepared by Thermal Spraying Process	Fuel Cell Prepared by Sintering Process (Present Invention)
Required time for production	150 min/fuel cell	15 min/fuel cell
Yield on materials	3 - 10%	90% or more
Equipment cost	Basic Amount	1/10
Construction Cost	Basic Amount	1/5
Materials Cost	Basic Amount	1/2
Cell production cost	1/3 million yen/kw	50,000 yen/kw

The advantages of the invention are thus clear.

Therefore, claim 30 of Group XXIII is patentable for these additional reasons as well. Accordingly, reversal of the Examiner's rejections based on the claimed combination of limitations and the above arguments is respectfully requested.

X. Conclusion

Appellants have demonstrated that the Examiner has failed to successfully allege that the rejected claims are anticipated or are *prima facie* obvious. Further, even if the Examiner established a *prima facie* case of obviousness, then this obviousness is rebutted by unexpected results.

For the reasons advanced above, it is respectfully submitted that all claims in this application are allowable. Thus, favorable reconsideration and reversal of the Examiner's rejection of claims 4-30 under 35 U.S.C. §§ 102 and 103, by the Honorable Board of Patent Appeals and Interferences, are respectfully solicited.

The required Appeal Brief fee in the amount of $330.00 is attached hereto.

Pursuant to 37 C.F.R. §§ 1.17 and 1.136(a), Appellants respectfully petition for a one (1) month extension of time for filing a reply in connection with the present application, and the required fee of $110.00 is attached hereto.

If necessary, the Commissioner is hereby authorized in this, concurrent, and further replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fee required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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MSW/REG/jls
Attachment: APPENDIX A
APPENDIX B
APPENDIX C
APPENDIX D

APPENDIX A
CLAIMS ON APPEAL

4. A solid electrolyte fuel battery, in which a sintered interconnector is used for connecting cells of the solid electrolyte fuel battery, and the sintered interconnector comprises a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba.

5. The solid electrolyte fuel battery as claimed in claim 4, wherein the current passage of the interconnector is current collection in the vertical direction from a fuel electrode through the interconnector.

6. A solid electrolyte fuel battery, in which a co-sintered interconnector for connecting cells of the solid electrolyte fuel battery comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Ca, Sr or Ba, B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$.

7. The solid electrolyte fuel battery as claimed in claim 6, wherein the current passage of the interconnector is current collection in the vertical direction.

8. A solid electrolyte fuel battery, in which a co-sintered interconnector for connecting cells of the solid electrolyte fuel battery comprises a material

having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Mg, B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$.

9. The solid electrolyte fuel battery as claimed in claim 8, wherein the current passage of the interconnector is current collection in the vertical direction.

10. A solid electrolyte fuel battery, in which an interconnector for connecting cells of the solid electrolyte fuel battery comprises a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba, wherein the interconnector is integrally burned within said battery.

11. The solid electrolyte fuel battery as claimed in claim 10, wherein said battery comprises a fuel electrode, an electrolyte, an interconnector and an air electrode laminated onto a substrate, which are integrally burned within said battery.

12. A method of making a solid electrolyte fuel battery, in which an interconnector for connecting cells of the solid electrolyte fuel battery is co-sintered, and comprises a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba, said method comprising:

integrally burning within said battery the interconnector for connecting

cells of the solid electrolyte fuel battery.

13. The method of making the solid electrolyte fuel battery as claimed in claim 12, wherein said battery comprises a fuel electrode, an electrolyte, an interconnector and an air electrode laminated onto a substrate.

14. A method of making a solid electrolyte fuel battery, in which a co-sintered interconnector for connecting cells of the solid electrolyte fuel battery comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Ca, Sr or Ba, B is a rare earth element, aluminum or chromium, C is titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$, said method comprising:

integrally burning within said battery the interconnector for connecting cells of the solid electrolyte fuel battery.

15. The method of making the solid electrolyte fuel battery as claimed in claim 14, wherein said battery comprises a fuel electrode, an electrolyte, an interconnector and an air electrode laminated onto a substrate.

16. A method of making a solid electrolyte fuel battery, in which a co-sintered interconnector for connecting cells of the solid electrolyte fuel battery comprises a material having a matrix of the general formula $A_{1-x}B_xC_{1-y}D_yO_3$ where A is Mg, B is a rare earth element, aluminum or chromium, C is

titanium, D is niobium or tantalum, $0 < x \leq 0.2$ and $0 \leq y \leq 0.2$, said method comprising:

integrally burning within said battery the interconnector for connecting cells of the solid electrolyte fuel battery.

17. The method of making the solid electrolyte fuel battery as claimed in claim 16, wherein said battery comprises a fuel electrode, an electrolyte, an interconnector and an air electrode laminated onto a substrate.

18. The method of claim 12, wherein the current passage of the interconnector is current collection in the vertical direction.

19. The method of claim 14, wherein the current passage of the interconnector is current collection in the vertical direction.

20. The method of claim 16, wherein the current passage of the interconnector is current collection in the vertical direction.

21. The method of claim 12, wherein the integrally burning is performed at a temperature of 1,300 °C to 1,400 °C.

22. The method of claim 14, wherein the integrally burning is performed at a temperature of 1,300 °C to 1,400 °C.

23. The method of claim 16, wherein the integrally burning is performed

at a temperature of 1,300 °C to 1,400 °C.

24. The solid electrolyte fuel battery as claimed in claim 4, wherein the interconnector is a hermetic interconnector having a relative density of greater or equal to 94%.

25. The solid electrolyte fuel battery as claimed in claim 6, wherein the interconnector is a hermetic interconnector having a relative density of greater or equal to 94%.

26. The solid electrolyte fuel battery as claimed in claim 8, wherein the interconnector is a hermetic interconnector having a relative density of greater or equal to 94%.

27. The solid electrolyte fuel battery as claimed in claim 10, wherein the interconnector is a hermetic interconnector having a relative density of greater or equal to 94%.

28. A solid electrolyte fuel battery, in which a sintered interconnector is used for connecting cells of the solid electrolyte fuel battery, and the sintered interconnector comprises a material having a matrix consisting essentially of $MTiO_3$ where M is Mg, Ca, Sr, or Ba.

29. The solid electrolyte fuel battery as claimed in claim 4, wherein the sintered interconnector was formed by sintering at a temperature of 1,300-1,500 ^{0}C.

30. A solid electrolyte fuel battery, which comprises:

cells of the solid electrolyte fuel battery; and

a sintered interconnector for connecting the cells of the solid electrolyte fuel battery, the sintered interconnector comprising a material having a matrix of the general formula $MTiO_3$ where M is Mg, Ca, Sr, or Ba, and the sintered material has been formed by a step consisting essentially of sintering the material after molding.